

## PROPOSAL COVER SHEET

**Proposal to:** CALFED Bay-Delta Program Office

**Submitting Organization:**

The Regents of the University of California  
University of California  
One Shields Avenue  
Davis, CA 95616

**Title of Proposed Research:** Fish Passage Improvements in Clear Creek: Effects of Removal of McCormick Dam on Sediment Transport

**Total Amount Requested:** **Proposed Duration:** **Desired Starting Date:**

\$92,963

One Year

December 1, 1998

**Principal Investigator:**

**Department:**

**Phone Number:**

G. T. Orlob

CEE

(530) 752-1424

**Checks made payable to:**

The Regents of the University of California

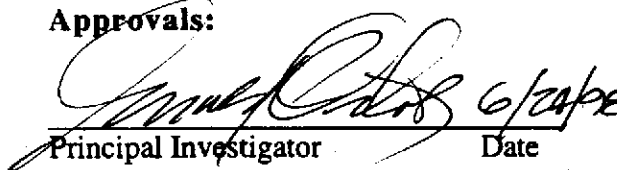
**Send checks to:**

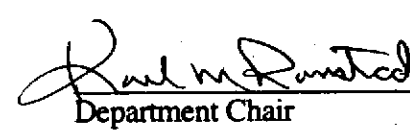
University of California  
Davis Campus  
Cashier's Office, 173 Mrak Hall  
One Shields Avenue  
Davis, CA 95616


**Send Award Notice to:**

Office of Research  
410 Mrak Hall  
University of California  
One Shields Avenue  
Davis, CA 95616-8671  
(530) 752-2075/(530) 752-5432 (FAX)

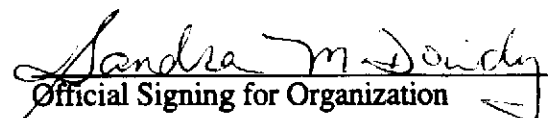
**Approvals:**

 6/24/98  
Principal Investigator Date

 \_\_\_\_\_  
Department Chair Date

 6/25  
Dean, College/School Date

\_\_\_\_\_  
Other Endorsement Date

 JUN 29 1998  
Official Signing for Organization Date

Sandra M. Dowdy  
Contracts and Grants Analyst

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: Fish Passage Improvements in Clear Creek: Effects of Removal of McCormick Dam on Sediment Transport

Applicant Name: Gerald T. Orlob, Ph.D., P.E.

Mailing Address: Department of Civil and Environmental Engineering, University of California, One Shields Avenue, Davis, CA 95616

Telephone: (530) 752-1424

Fax: (530) 752-7872

Amount of funding requested: \$92,963 for 1 year

Indicate topic for which you are applying:

- |   |   |
|---|---|
| <input type="checkbox"/> Fish Passage Assessment  | <input checked="" type="checkbox"/> Fish Passage Improvements |
| <input type="checkbox"/> Floodplain and Habitat Restoration                               | <input type="checkbox"/> Gravel Restoration                   |
| <input type="checkbox"/> Fish Harvest   | <input type="checkbox"/> Species Life History Studies         |
| <input type="checkbox"/> Watershed Planning/Implementation                                | <input type="checkbox"/> Education                            |
| <input type="checkbox"/> Fish Screen Evaluations – Alternatives and Biological Priorities |   |

Indicate geographic area of your proposal:

- |   |  |
|---|--|
| <input type="checkbox"/> Sacramento River Mainstem              | <input checked="" type="checkbox"/> Sacramento Tributary: <u>Clear Creek</u> |
| <input type="checkbox"/> Delta                                  | <input type="checkbox"/> East Side Delta Tributary: _____                    |
| <input type="checkbox"/> Suisun Marsh and Bay                   | <input type="checkbox"/> San Joaquin Tributary: _____                        |
| <input type="checkbox"/> San Joaquin River Mainstem             | <input type="checkbox"/> Other: _____  |
| <input type="checkbox"/> Landscape (entire Bay-Delta watershed) | <input type="checkbox"/> North Bay: _____                                    |

Indicate the primary species which the proposal addresses:

- |  |   |
|--|---|
| <input type="checkbox"/> San Joaquin and East Side Delta tributaries fall-run chinook salmon |   |
| <input type="checkbox"/> Winter-run chinook salmon   | <input checked="" type="checkbox"/> Spring-run chinook salmon |
| <input type="checkbox"/> Late fall-run chinook salmon  | <input type="checkbox"/> Fall-run chinook salmon              |
| <input type="checkbox"/> Delta smelt   | <input type="checkbox"/> Longfin smelt                        |
| <input type="checkbox"/> Splittail   | <input checked="" type="checkbox"/> Steelhead trout           |
| <input type="checkbox"/> Green sturgeon  | <input type="checkbox"/> Striped bass                         |
| <input type="checkbox"/> Migratory birds   |   |

**COVER SHEET (PAGE 2 of 2)**

**May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION**

Indicate the type of applicant:

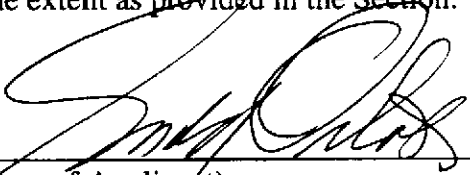
- |  |   |
|--|---|
| <input type="checkbox"/> State agency                      | <input type="checkbox"/> Federal agency |
| <input type="checkbox"/> Public / Non-profit joint venture | <input type="checkbox"/> Non-profit     |
| <input type="checkbox"/> Local government / district       | <input type="checkbox"/> Private party  |
| <input checked="" type="checkbox"/> University             | <input type="checkbox"/> Other: _____   |

Indicate the type of project:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Planning | <input type="checkbox"/> Implementation |
| <input type="checkbox"/> Monitoring          | <input type="checkbox"/> Education      |
| <input type="checkbox"/> Research            |   |

By signing below, the applicant declares the following:

1. the truthfulness of all representations in their proposal;
2. the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and
3. the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

  
\_\_\_\_\_  
(Signature of Applicant)

## **EXECUTIVE SUMMARY**

### **FISH PASSAGE IMPROVEMENTS IN CLEAR CREEK: EFFECTS OF REMOVAL OF McCORMICK DAM ON SEDIMENT TRANSPORT**

#### **A. Applicant**

Gerald T. Orlob, Ph.D., P.E.

Department of Civil and Environmental Engineering, University of California, Davis

#### **B. Project Description and Primary Ecological Objectives**

McCormick (Saeltzer) Dam is located on Clear Creek approximately 10 miles below Whiskeytown Dam and 6 miles upstream of the confluence with the Sacramento River. The placement of McCormick Dam and Whiskeytown Dam upstream, combined with flow regulation in Clear Creek, have greatly reduced recruitment of new gravel in the lower reaches of the creek, where gravel needed for spawning purposes has also been significantly depleted by mining. Additionally, McCormick Dam, a 15-foot tall low head dam, serves as a migration barrier for spring run chinook salmon and steelhead trout; species requiring the cool water temperatures available upstream of McCormick Dam for successful spawning and rearing. Although two attempts have been made to install fish ladders at McCormick Dam, the modifications have been shown by DFG to be ineffective in allowing fish passage. Recently, agencies responsible for channel and water quality restoration in the creek have considered several options for removal of McCormick Dam, while the Townsend Flat Water Company is considering implementation of a diversion upstream to meet local water needs. Although it is expected that removal of McCormick Dam will improve fish passage in Clear Creek while enhancing gravel supply to aid in restoration of the channel downstream, very little data and information currently exist on the creek morphology, flow behavior, and sediment supply and transport characteristics to guide decisions for management of sediment and water quality in Clear Creek.

The ecological objectives of this project are to measure and identify the morphological characteristics of Clear Creek; to examine changes in flow and channel morphology under different hydrologic conditions; to characterize sediment sources and transport mechanisms and to evaluate the potential transport of sediments trapped behind McCormick dam under different hydrologic conditions; to examine potential changes in channel gradient and to estimate times required for erosion of the sediment 'wedge' behind McCormick Dam to improve fish passage to upstream spawning habitat; and to examine the potential and time required for recruitment of gravel to restore pits and spawning reaches downstream of McCormick Dam.

#### **C. Approach and Schedule**

The proposed project will be completed using a combination of field monitoring, data gathering, and review of available information to determine physical, hydrologic and sediment transport characteristics of Clear Creek. Review and analysis of the data combined with implementation of physics-based hydrodynamic and sediment transport models will provide an improved understanding of flow and sediment dynamics in the system. Results of this project will directly assist those responsible for management and restoration of sediment, water quality, and improvement of fish passage in Clear Creek. It is expected that the work proposed in this project will be completed within one year from the project inception.

#### **D. Justification for CALFED Funding**

The proposed project meets the Ecosystem Restoration Program Plan (ERPP)

implementation objectives of restoring adequate sediment supply to rebuild shallow-water spawning habitat in the lower reaches of Clear Creek below McCormick Dam, and improving fish passage to upstream habitat in Clear Creek where cold water temperature conditions necessary for successful spawning and rearing are found.

#### **E. Budget Costs and Third Party Impacts**

Costs for the proposed project are \$92,963. Matching contributions estimated in the amount of \$24,295 will be provided in the form of time volunteered by the principal and co-principal investigators, and through use of equipment currently owned by UC Davis.

No third party impacts are expected as a result of the proposed project.

#### **F. Applicant Qualifications**

Dr. Gerald T. Orlob, P.E., is Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis and will serve as principal investigator to the proposed project. Throughout a career in professional practice, engineering education and research, Dr. Orlob has specialized in the development and application of systems analysis techniques, especially mathematical models of surface water systems, for water quality management.

Dr. Ray B. Krone, Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis, will serve as co-principal investigator. Dr. Krone's research has been largely concentrated on the fate and transport of sediment, both cohesive and non-cohesive, in surface water systems, rivers, estuaries, and coastal waters. He has served as an advisor / consultant to governmental agencies and private organizations on numerous projects related to sediment management.

Dr. Ian P. King, Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis, will also serve as co-principal investigator. In addition to teaching and research related to hydromechanics and water quality, Dr. King has wide experience in private professional practice concerned with the development and application of mathematical models for simulation of surface water systems.

#### **G. Monitoring and Data Evaluation**

Field surveys will be performed to identify key system characteristics that relate to flow and sediment transport in Clear Creek including topography, geology, soils, hydrology, land use, vegetation, and stream morphology. Cross-sections surveys will be made during dry weather conditions and again during or immediately after wet weather conditions, to evaluate changes in stream morphology as a result of high flows. Field surveys will be conducted to examine potential sources of sediments in the watershed and to monitor and observe sediments and sediment transport processes.

#### **H. Local Support, Coordination with other programs, Compatibility with CALFED objectives**

Collaboration and cooperation with the California Department of Fish and Game and the Western Shasta RCD are expected to avoid duplication of efforts and to ensure project goals and directions will be useful for water quality management and restoration efforts in Clear Creek. The proposed project is directly responsive to the objectives of the CALFED Bay-Delta program by evaluating existing conditions and examining alternatives for improvement of fish passage and restoration of spawning habitat for several tier one primary species in Clear Creek.

**FISH PASSAGE IMPROVEMENTS IN CLEAR CREEK:  
EFFECTS OF REMOVAL OF McCORMICK DAM ON SEDIMENT TRANSPORT**

**Principal Investigator:** Gerald T. Orlob, Professor Emeritus  
Department of Civil and Environmental Engineering  
University of California  
Davis, CA 95616  
Tel: (530) 752-1424  
Fax: (530) 752-7872  
e-mail: gtorlob@ucdavis.edu

**Co-Principal Investigators:** Ray B. Krone, Professor Emeritus  
Department of Civil and Environmental Engineering  
University of California  
Davis, CA 95616  
Tel: (530) 754-9579  
Fax: (530) 752-7872  
e-mail: rbkrone@ucdavis.edu

Ian P. King, Professor Emeritus  
Department of Civil and Environmental Engineering  
University of California  
Davis, CA 95616  
Tel: (916) 752-8386  
Fax: (916) 752-7872  
e-mail: ipking@ucdavis.edu

**Organization type:** University of California (Public Institution)  
**Tax Status:** Tax exempt  
**Tax Identification no.:** 94-6036494-W

**Collaborators:** California Department of Fish and Game, Western Shasta RCD  
(field and data assistance)

## A. Project Description and Approach

McCormick (Saeltzer) Dam is located on Clear Creek approximately 10 miles below Whiskeytown Dam and 6 miles upstream of the confluence with the Sacramento River. The dam, currently owned by the California Department of Fish and Game (DFG), is an approximately 15-foot tall low head dam which was originally constructed to raise the water surface elevation in Clear Creek at Townsend Flat to meet the needs of a local agricultural diversion. However, the placement of McCormick Dam and Whiskeytown Dam upstream, combined with flow regulation in Clear Creek, have greatly reduced recruitment of new gravel in the lower reaches of the creek, where gravel needed for spawning purposes has also been significantly depleted by mining. DFG is currently actively placing gravel into the system immediately below Whiskeytown Dam.

In addition to its impacts on sediment transport in Clear Creek, McCormick Dam is also impeding passage of two target species identified as tier one primary species under the CALFED program, spring run chinook salmon and steelhead trout, to upstream reaches where cool water temperature conditions prevail. Although two attempts have been made to install fish ladders at McCormick Dam to provide adequate fish passage, they have been shown by DFG to be ineffective in allowing fish passage. Additionally, recent structural and seismic surveys performed by the California Department of Water Resources (DWR) have determined that the dam is of questionable stability. Consequently, agencies responsible for channel and water quality restoration in the creek have considered several options for removal of McCormick Dam, while the Townsend Flat Water Company is considering implementation of a diversion upstream to meet the local water needs. Preliminary geologic surveys were conducted by DWR to determine the depths, types and sizes of sediments trapped behind McCormick Dam, including measurement of the sediments that are deposited approximately up to the crest of the dam. DFG is considering dredging of sediments behind the dam to remove some of the fine and coarse sediments in the upper layers of the deposits, leaving gravels to be flushed through the system during high flow periods. Downstream of McCormick Dam, a channel restoration project is currently being carried out (led by the Western Shasta RCD) to reverse the effects of historical aggregate extraction. Although it is expected that removal of McCormick Dam will improve fish passage in Clear Creek while enhancing gravel supply to aid in restoration of the channel downstream, very little data and information currently exist on the creek morphology and sediment supply and transport characteristics to guide decisions for management of sediment and water quality in Clear Creek.

### Project Objectives

The objectives of the proposed project are as follows:

- measure and identify current characteristics of Clear Creek including identification of topography, geology, soils, hydrology, land use, vegetation, stream morphology and measurement of cross-sections,
- examine changes in flow and channel cross-section under different hydrologic conditions,
- characterize sediment sources and transport mechanisms in Clear Creek and evaluate the potential transport of sediments trapped behind McCormick dam under different hydrologic conditions,
- estimate times required for erosion of the sediment 'wedge' behind McCormick Dam, as necessary, to improve fish passage to upstream spawning habitat,

- examine potential for changes in channel gradient beneath the sediment 'wedge' and downstream of McCormick Dam, and
- examine potential for filling in or recruitment of gravels in downstream pits and spawning reaches and the time required for deposition of sediments in these downstream reaches, based on different flow rates proposed for Clear Creek during high and low flow periods under the CALFED program.

### Project Approach

The approach proposed for accomplishing this project is to thoroughly examine the available data and information, and to supplement these data with additional monitoring of sediments and channel morphology throughout the creek. In addition to field monitoring and observations, flow and the potential for sediment transport in the creek will be examined using a one-dimensional hydrodynamic model of Clear Creek that will be developed and applied from Whiskeytown Dam to the confluence with the Sacramento River. Using velocities and water depths provided by the hydrodynamic model, a sediment transport model will be applied to evaluate transport of sediments trapped behind McCormick Dam. The models considered for this study are the finite element unsteady hydrodynamic and water quality models, RMA2 and RMA11, respectively. These models are currently being applied to Clear Creek in a related study sponsored by the U.S. Bureau of Reclamation to examine flow and water temperature in the stream under a variety of hydrologic and reservoir operation conditions.

### **B. Proposed Scope of Work**

The following tasks are proposed to improve fish passage in Clear Creek:

#### **Task 1 Identify existing data and alternatives**

**Purpose:** To gather existing biological, physical and hydrologic data to be used in evaluating the system; to identify gaps in data; to gather information on the alternatives considered for removal for McCormick Dam and for relocation of the local diversion.

**Method:** Agencies and groups who have participated in field programs or analyses in Clear Creek will be contacted to obtain existing data, reports and information. These data, particularly sediment surveys, will be reviewed to determine level of applicability to the proposed project and to identify existing gaps in information. Information on spawning sites and necessary characteristics will be reviewed. Hydrologic records will be gathered to determine historical flows in Clear Creek; these data will be used to determine the velocities and sediment transport capacity of the stream. Collaboration with DFG will be undertaken to determine alternatives being considered to facilitate fish passage in Clear Creek. UCD will collaborate with agencies participating in restoration of Clear Creek (e.g., DFG, DWR, and Western Shasta RCD) to identify critical reaches for spawning both upstream and downstream of McCormick Dam and to determine the areas where gravel recruitment is desired.

**Schedule:** 1 month

**Budget:** \$8,000

**Deliverable:** Inventory of information available for Clear Creek.



## **Task 2      Perform field surveys of Clear Creek**

**Purpose:**      To obtain baseline physical data on stream morphology in Clear Creek and to evaluate channel carrying capacity.

**Method:**      Current characteristics of Clear Creek will be identified during a reconnaissance study combined with analysis of aerial photographs and review of available literature to determine key system characteristics such as topography, geology, soils, hydrology, land use, vegetation, and stream morphology, and to identify appropriate monitoring sites. Stream cross-sections will be surveyed at approximately 1/4 to 1/2 mile intervals upstream of McCormick Dam, depending on the channel morphology, gradient and changing cross-section. Cross-section measurements will be made at least at 1/4 mile intervals downstream of the dam. Surveys will include top-of-bank to top-of-bank cross-section measurements and channel characteristics. These surveys will be coordinated to supplement cross-section measurements available from collaborating agencies (e.g., DWR, DFG). The cross section data will be analyzed to determine the stream gradient and cross section geometries, and to evaluate the potential carrying capacity of the stream for increased sediment loads upon removal or alteration of McCormick Dam. Cross sections will be measured during dry weather conditions and again during or immediately after wet weather conditions (as conditions safely allow), to evaluate changes in stream morphology as a result of high flows.

**Schedule:**    3 months for surveys and analysis

**Budget:**      \$18,000

**Deliverable:** Documentation of the cross-section surveys and analysis of the physical characteristics of Clear Creek.

## **Task 3      Perform sediment surveys**

**Purpose:**      To determine the types and quantity of sediments available for transport, and to map the sediment deposition characteristics upstream of McCormick Dam.

**Method:**      Field surveys will be conducted to examine potential sources of sediments in the watershed and to monitor and observe sediment transport processes. Sediment samples will be taken at selected locations upstream of McCormick Dam to identify the types and characteristics of sediments. The information will be combined with cross-section and stream gradient information to estimate the depths of sediment deposits upstream of the dam. This information will be necessary to evaluate the amount of sediment that will require dredging or that will become available for transport downstream upon removal or alteration of McCormick Dam. Sediment and cross-section surveys will be performed during dry-weather and wet-weather conditions to examine changes in cross-sections as a result of high stream flows. It is expected that several monitoring trips will be conducted during the wet weather season to observe and monitor the effects of high flow conditions on sediment transport.

**Schedule:**    3 months, concurrently with Task 2.

**Budget:**      \$18,000

**Deliverable:** Documentation of the sediment surveys, map of sediment types and sediment deposits upstream of McCormick Dam, estimates of cross-section changes.

## **Task 4      Apply hydrodynamic model**

**Purpose:**      To evaluate the velocities and water depths in Clear Creek.

**Method:** An existing model of Clear Creek (UCD / USBR Whiskeytown Modeling Project) will be updated to reflect additional cross-section information. A hydrodynamic model, RMA2, will be applied to simulate velocities and water depths under a range of expected flows in Clear Creek. Using physical system geometry, the model can be applied in steady or dynamic mode using time steps of user-specified duration (e.g., half-hourly, hourly) to provide flow information at locations along the entire length of the stream from Whiskeytown Dam to the confluence with the Sacramento River. Calculated velocities and water depths will be used to evaluate sediment transport behavior in Clear Creek (see Task 5).

**Schedule:** 3 months

**Budget:** \$15,500

**Deliverable:** In-stream velocities and water depths for a range of specified reservoir release conditions.

#### **Task 5 Apply sediment transport model**

**Purpose:** To evaluate the sediment transport behavior upon removal of the dam and to examine changes in stream gradient and cross sections.

**Method:** The cross-section data gathered will be used to determine initial bottom elevations of the stream bed, and sediment survey data will be used to estimate initial depths of sediment deposits. An existing water quality and sediment transport model, RMA11, will be applied to Clear Creek to determine the time-varying changes in sediment transport and redistribution of sediments in the creek. Although RMA11 is currently capable of simulating cohesive (clays, fines) and non-cohesive (sand) sediment transport, the relationships for gravel transport must be added. Appropriate relationships will be obtained from a publicly accessible model that have been successfully tested, e.g., the U.S. Army Corps of Engineers' model, HEC-6, and incorporated into RMA11. A range of realistic hydrologic and project operation conditions will be selected to represent high flow events, and 'normal' operating conditions to demonstrate redistribution of the sediments in the lower reaches of Clear Creek. Results of this task will provide estimates of erosion and deposition rates, volumes and depths of sediments redistributed along the stream. Results will also assist in evaluating flow rates and time scales required for improvement of fish passage at the current location of McCormick Dam.

**Schedule:** 5 months (1 month concurrent with field work)

**Budget:** \$26,000

**Deliverable:** Estimates of erosion and deposition rates at locations throughout the creek; comparisons of flow rates and time scales required to erode the sediment 'wedge' behind McCormick Dam and to transport through or deposit in downstream reaches.

#### **Task 6 Reporting**

**Purpose:** To document analysis and results of monitoring and modeling efforts.

**Method:** A report will be prepared and presented to CALFED upon completion of this project to document project activities and to summarize findings as they pertain to transport of sediments and improvement of fish passage in Clear Creek upon removal of McCormick Dam.

**Schedule:** 1 month

**Budget:** \$7,463

**Deliverable:** Report of project activities, description of creek characteristics and sediment transport, recommendations for improving fish passage in Clear Creek.

### **C. Geographic Location**

Clear Creek is located in Shasta county and is a tributary to the Sacramento River. Flows in the lower reach of Clear Creek are principally regulated at Whiskeytown Dam, a component of the Central Valley Project. McCormick Dam, a small diversion dam constructed on Clear Creek in 1903, is located approximately 10 miles downstream of Whiskeytown Dam. This project will focus on the reach of Clear Creek extending from Whiskeytown Dam to its confluence with the Sacramento River, with special emphasis on fish passage and sediment transport problems associated with McCormick Dam. Please see map attached.

### **D. Expected Benefits**

Results of the proposed project will provide those responsible for maintaining water quality and restoration of viable populations of aquatic species in Clear Creek with a physics-based method for quantifying improvements for fish passage in Clear Creek upon removal of McCormick Dam. The aquatic species that will benefit from improvement of fish passage in Clear Creek are spring run chinook salmon and steelhead trout, identified as tier one primary species under the CALFED program.

Secondary benefits of this project are an improved understanding of sediment transport behavior in Clear Creek, and a method for estimating the volume and time of transport. These improved descriptions will benefit evaluation of sediment needs for channel restoration and recruitment of gravel for spawning needs in the lower reach of Clear Creek below McCormick Dam. The species that will benefit from increased gravel supply in the lower reach of Clear Creek are the late-fall run chinook salmon, identified as tier one primary species of concern, and fall run chinook salmon, identified as a secondary species under the CALFED program.

### **E. Background and Ecological / Biological / Technical Justification**

#### **Background**

Clear Creek provides aquatic habitat for spawning and rearing of several high risk aquatic species identified as tier one primary species under the CALFED program, including spring run chinook salmon and steelhead trout. In Clear Creek, most of the high quality spawning habitat is located within the upper reaches just below Whiskeytown Dam, where aquatic species can benefit from cold water releases before water temperatures are elevated due to solar radiation. Lower reaches of Clear Creek below McCormick Dam provide spawning habitat for late fall run chinook, also identified as a tier one primary species, and fall run chinook salmon. These two species typically use the lower reaches of Clear Creek when flows are not subjected to the intense solar heating of the summer months.

Although McCormick Dam is equipped with a fish ladder, its effectiveness is limited, serving instead as a barrier to fish passage and adversely affecting migration. A second bypass structure implemented more recently has also been unsuccessful in improving fish passage. Problems associated with passage of fish at the barrier include obstruction of or delays in fish migration, and stranding and straying of migrants. In addition to impeding fish passage in Clear Creek, the dam has restricted and altered sediment transport processes in the creek. Sediments have deposited behind the dam to within 6-8 inches from the crest. Consequences of alteration

of natural sediment transport processes include changes in the geomorphology of the stream below McCormick Dam and depletion of gravel necessary for spawning areas downstream. Upstream of the barrier dam, the settled sediments present problems associated with decreased water depths due to decreased capacity, and storage of heavy metals in the sediments. The current configuration of the dam and fish passage structure do not include any measures for maintaining natural sediment transport in Clear Creek, nor any mechanisms for flushing of sediments.

#### Technical and Biological Justification

McCormick Dam adversely impacts migration of high risk species. Therefore, it is necessary to evaluate current conditions and to estimate potential changes under the alternative solutions being considered to improve fish passage in Clear Creek, namely, removal of McCormick Dam. To determine the extent to which improvements can be made by removal of the dam, it is necessary to first assess the current status of Clear Creek morphology (e.g., by measuring cross-sections), to characterize sediment sources, types and quantities, and to identify the locations of spawning sites along upstream and downstream of the barrier dam. Because sensitive species also spawn in reaches below McCormick Dam, such assessments are necessary to determine the potential readjustment of stream gradient and increases in sediment concentrations if the dam is removed, while considering the potential effects in meeting the required diversion needs at Townsend Flat. The hydrodynamic and sediment transport models will provide a physics-based method to evaluate and quantify sediment transport under various conditions.

The proposed project meets the objectives of the CALFED Bay- Delta program by evaluating existing conditions and examining alternatives for improvement of fish passage and spawning habitat for several tier one primary species in Clear Creek. The proposed project also is responsive to targets specified for Clear Creek, a part of the North Sacramento Ecological Zone, as specified by CALFED. The proposed work meets the following Ecosystem Restoration Program Plan (ERPP) implementation objectives:

- Dams, Reservoirs, Weirs, and other Human-made structures: "Increase the connection of upstream spawning and rearing habitats with the mainstem rivers in the Sacramento - San Joaquin basin in order to increase success of adult spawners and survival of juvenile downstream migrants." (p. 50 Executive Summary, p. 231 ERPP Volume I)
- Natural Sediment Supply in Clear Creek: "Establish an adequate sediment supply to riverine and estuarine systems in order to ... provide sediments to rebuild wetlands and shallow water habitats ..." (p. 46 Executive Summary, p. 32 ERPP Volume I)

#### **F. Monitoring and Data Evaluation**

Please see tasks 2 and 3 above.

#### **G. Implementability**

The applicants will collaborate with DFG, Western Shasta RCD, and other agencies responsible for ensuring water quality in Clear Creek to ensure environmental compliance when collecting sediment samples and measuring cross-sections. Other impacts, permit requirements, etc. are not anticipated for any other components of the proposed project.

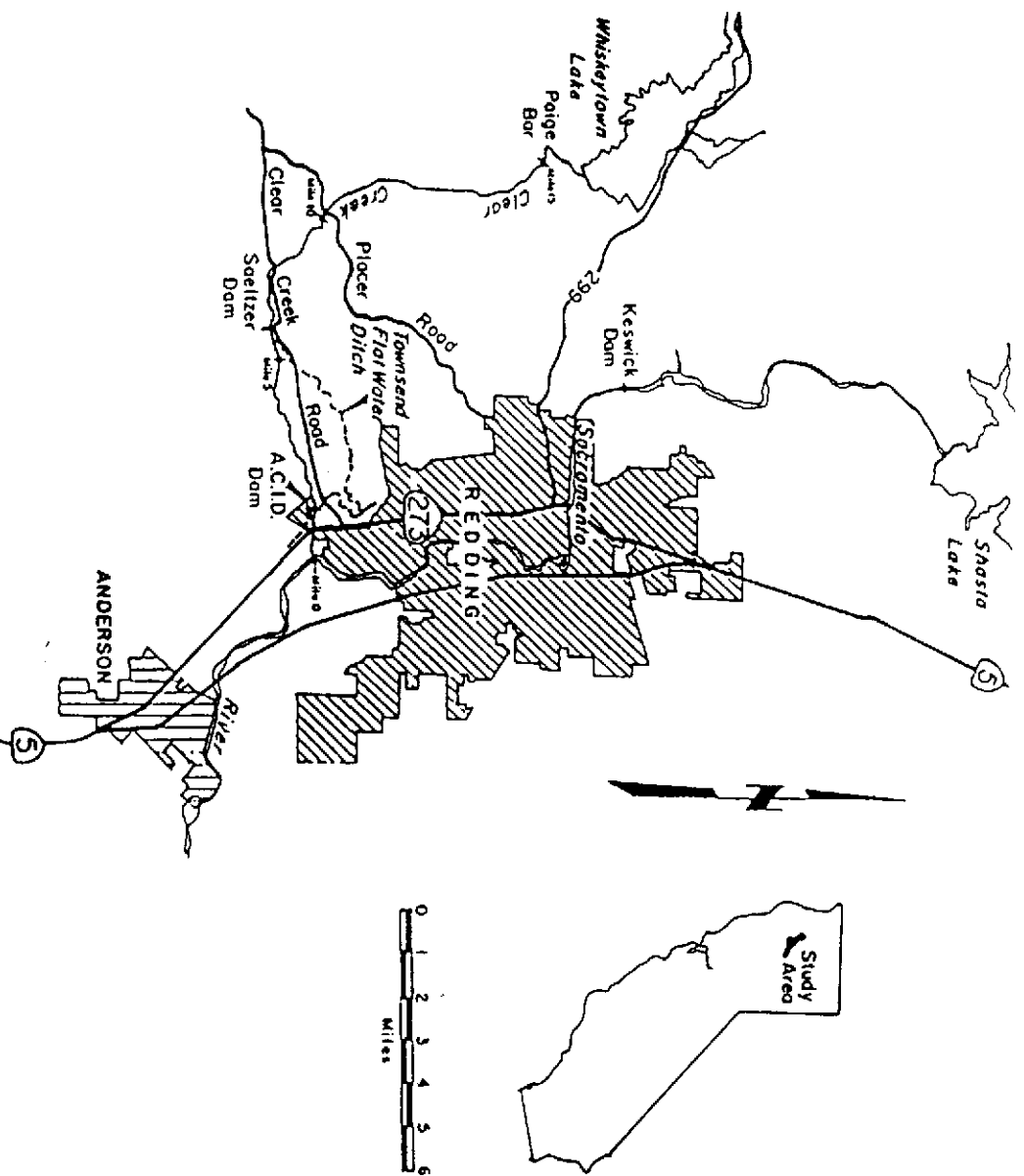


Figure 1. Location map of Clear Creek and McCormick (Saeltzer) Dam

## Costs and Schedule to Implement Proposed Project

### A. Budget Costs

Direct Salary and Benefits		Requested funds	Matching contribution
A. Personnel			
1	Principal Investigator; 12 mo. @ 5% (see note 1)		\$7,361
2	Co-principal Investigator; 12 mo. @ 5% (see note 1)		\$5,847
	Co-principal Investigator; 12 mo. @ 5% (see note 1)		\$6,293
3	PGRE IV, student; \$2,759; 9 mo. @ 75%, 3 mo. @ 100%	\$26,900	
4	PGRE II, student; \$2,530; 12 mo. @ 50%	\$15,180	
5	Undergraduate assistant; 9 mo. @ \$400, 3 mo. @ \$1000	\$6,600	
6	Staff Technical Assistant	\$2,652	
Subtotal, personnel		<u>\$51,332</u>	<u>\$19,501</u>
B. Fringe Benefits			
	0.092 x (A1+A2) (see note 1)		\$1,794
	0.044 x (A3+A4)	\$1,852	
	0.235 x (A6)	\$623	
Subtotal, benefits		<u>\$2,475</u>	<u>\$1,794</u>
Miscellaneous Direct Costs			
C. Travel		\$1,500	
D. Supplies		\$1,000	
Subtotal, miscellaneous		<u>\$2,500</u>	<u>\$0</u>
Equipment Costs			
E. Equipment (See note 2)		\$2,000	
Equipment (See note 3)			\$3,000
Subtotal, equipment		<u>\$2,000</u>	<u>\$3,000</u>
Overhead and Fees			
F. Student Fees: 2 @ \$4,800		\$9,600	
G. Overhead 0.445 x (A + B + C + D) (federal contract rate)		\$25,056	
Subtotal, overhead		<u>\$34,656</u>	<u>\$0</u>
Project Total		<u>\$92,963</u>	<u>\$24,295</u>

### Notes:

- Salaries and fringe benefits for principal investigator and co-principal investigator have been calculated as 5% equivalent time, based on academic salary. The principal- and co-principal investigators are providing time to the proposed project as matching in-kind services.
- Sediment sampling equipment and some surveying equipment.
- The equipment currently available in-house that will be used for the proposed project includes: HydroLab H20 Multiprobe, Marsh McBirney velocity meter, sieve analysis and surveying equipment. The matching contribution for equipment costs is estimated based upon usage anticipated for the proposed project and an estimate of an annual depreciation of capital costs. Use of the equipment is effectively being provided at no cost to the project.

## Estimated Cost Breakdown by Task

	<u>Requested funds</u>
1. Data Acquisition and Evaluation	\$8,000
2. Field surveys	18,000
3. Sediment surveys	18,000
4. Hydrodynamic modeling	15,500
5. Sediment transport modeling	26,000
6. Documentation	7,463
Project Total	<u>\$92,963</u>

## B. Schedule Milestones

The schedule for the proposed project is presented in the table below. Field surveys will be conducted during dry and wet weather conditions. Progress reports will be submitted quarterly, and a final report will be submitted upon completion of the project. It is expected that this project will be completed within twelve months from the project inception.

Task	Months from project start											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Data gathering	✓											
2. Field surveys		✓	✓				✓					
3. Sediment surveys		✓	✓				✓					
4. Hydrodynamic modeling				✓	✓	✓						
5. Sediment transport modeling							✓	✓	✓	✓	✓	✓
6. Progress reports				✓				✓				
7. Documentation												✓

## C. Third Party Impacts

No third party impacts are anticipated as a result of this project.

## **Project Organization**

The proposed project will be conducted under the guidance of Dr. Gerald T. Orlob, who will serve as principal investigator to this project. Dr. Ray B. Krone, an expert in the field of sediment transport, will serve as co-principal investigator and will direct efforts in the field monitoring, data analysis, and sediment transport modeling components of the project. Dr. Ian P. King, experienced in development and application of mathematical models for simulation of hydrodynamics and water quality in natural systems, will serve as co-principal investigator and consultant on modeling aspects of the study. Ms. Camilla Saviz, a doctoral candidate at UC Davis, will coordinate and conduct the field monitoring, data analysis, and model implementation efforts. It is expected that one graduate student at the Masters level, and one undergraduate student will assist in field monitoring, data analysis and running of the hydrodynamic and sediment transport models.

## **Applicant Qualifications**

### **Gerald T. Orlob, Principal Investigator**

Dr. Orlob is presently Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis. He holds degrees in Civil, Environmental and Hydraulic Engineering, and is a registered Professional Engineer in California. Throughout a career in professional practice, engineering education and research, Dr. Orlob has specialized in the development and application of systems analysis techniques, especially mathematical models of surface water systems, for water quality management. He has published widely in the technical literature. His contributions in his field of specialization have been recognized by awards from professional and scientific organizations. He is a member of the National Academy of Engineering. As an emeritus professor at UC Davis, he continues active participation in studies related to water quality issues, recently focused in Northern California systems including the Sacramento, Trinity, Feather, Shasta, and Klamath rivers, Clear Creek, the Sacramento-San Joaquin Delta, and Whiskeytown and Keswick Reservoirs.

### **Ray B. Krone, Co-Principal Investigator**

Dr. Krone is Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis. He holds degrees in Soil Science, Civil and Environmental Engineering. He was instrumental in development of the environmental engineering program of teaching and research at UC Davis. His own research has been largely concentrated on the fate and transport of sediment, both cohesive and non-cohesive, in surface water systems, rivers, estuaries, and coastal waters. He was responsible for the original development of mathematical models currently being used to simulate the processes of deposition and resuspension of sorbed toxic substances in estuaries. He is an advisor / consultant to governmental agencies and private organizations on sediment management. Author of numerous scientific publications on sediment problems, Dr. Krone has been honored by the American Society of Civil Engineers and the American Academy for the Advancement of Science for his seminal contributions. He is a member of the National Academy of Engineering.



Ian P. King, Co-Principal Investigator

Dr. King is Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis. He holds BS and MS degrees in Civil and Structural Engineering and a Ph.D. in Engineering Mechanics. In addition to teaching and research related to hydromechanics and water quality, Dr. King has wide experience in private professional practice concerned with the development and application of mathematical models for simulation of surface water systems. He is the original developer of a suite of finite element models (RMA models) that are being widely applied to characterize the hydrodynamic behavior of rivers, lakes and reservoirs, estuaries, and coastal environments. These models form the basis for water quality simulation in such systems. At UC Davis, Dr. King has taught in the undergraduate and graduate programs in water resources and environmental engineering and is engaged with his students in research related to water resources management. His recent research has been concerned with extension of the finite element method to solution of complex three-dimensional flow fields.

Camilla M. Saviz

Ms. Saviz is presently a doctoral candidate in the Department of Civil and Environmental Engineering at the University of California at Davis. She holds BS and MS degrees in Mechanical Engineering and an MBA degree in general management. While pursuing her doctoral degree in Civil Engineering at UC Davis, Ms. Saviz has been engaged as a post-graduate research engineer, working on several projects related to analysis and modeling of hydrodynamics and water quality in surface water systems including the Upper Sacramento River and in the San Francisco Bay-Delta system. Her dissertation research has focused on implementation of hydrodynamic and water quality models to examine the fate and transport of copper discharged with acidic mine drainage into Keswick Reservoir. The product of her research will be used to evaluate alternatives for managing reservoir operations and contaminant discharges to the Sacramento River.

## U.S. Department of the Interior

**Certifications Regarding Debarment, Suspension and  
Other Responsibility Matters, Drug-Free Workplace  
Requirements and Lobbying**

Persons signing this form should refer to the regulations referenced below for complete instructions:

**Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions -** The prospective primary participant further agrees by submitting this proposal that it will include the clause titled, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions. See below for language to be used or use this form for certification and sign. (See Appendix A of Subpart D of 43 CFR Part 12.)

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions -** (See Appendix B of Subpart D of 43 CFR Part 12.)

**Certification Regarding Drug-Free Workplace Requirements -** Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals) - (See Appendix C of Subpart D of 43 CFR Part 12)

Signature on this form provides for compliance with certification requirements under 43 CFR Parts 12 and 18. The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of the Interior determines to award the covered transaction, grant, cooperative agreement or loan.

---

**PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions**

---

**CHECK ☒ IF THIS CERTIFICATION IS FOR A PRIMARY COVERED TRANSACTION AND IS APPLICABLE**

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;
  - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
  - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
  - (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

---

**PART B: Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions**

---

**CHECK ☐ IF THIS CERTIFICATION IS FOR A LOWER TIER COVERED TRANSACTION AND IS APPLICABLE**

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

SI-5816  
June 1998  
(Tide from versions SI-1003, SI-1004,  
SI-1005, SI-1006 and SI-1007)

**PART C: Certification Regarding Drug-Free Workplace Requirements**

☒ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL

**Alternate I. (Grantees Other Than Individuals)**

A. The grantee certifies that it will or continue to provide a drug-free workplace by:

- (a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (b) Establishing an ongoing drug-free awareness program to inform employees about—
  - (1) The dangers of drug abuse in the workplace;
  - (2) The grantee's policy of maintaining a drug-free workplace;
  - (3) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
- (c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);
- (d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will —
  - (1) Abide by the terms of the statement; and
  - (2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- (e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification numbers(s) of each affected grant;
- (f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted —
  - (1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
  - (2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- (g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a) (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

Check ☐ if there are workplaces on file that are not identified here.

**PART D: Certification Regarding Drug-Free Workplace Requirements**

☐ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL

**Alternate II. (Grantees Who Are Individuals)**

- (a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant;
- (b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.

**PART E: Certification Regarding Lobbying  
Certification for Contracts, Grants, Loans, and Cooperative Agreements**

**CHECK ☒ IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND  
THE AMOUNT EXCEEDS \$100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT;  
SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.**

**CHECK ☐ IF CERTIFICATION IS FOR THE AWARD OF A FEDERAL  
LOAN EXCEEDING THE AMOUNT OF \$150,000, OR A SUBGRANT OR  
SUBCONTRACT EXCEEDING \$100,000, UNDER THE LOAN.**

The undersigned certifies, to the best of his or her knowledge and belief, that:


- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

As the authorized certifying official, I hereby certify that the above specified certifications are true.

THE REGENTS OF THE UNIVERSITY  
OF CALIFORNIA

JUN 29 1998

  
SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL  
Sandra M. Dowdy  
Contracts and Grants Analyst

TYPED NAME AND TITLE

DATE

Figure 1  
Standard Form 424

**APPLICATION FOR  
FEDERAL ASSISTANCE**

OMB Approval No. 3348-0043

1. TYPE OF SUBMISSION: Application <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction Preapplication <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction		2. DATE SUBMITTED 7/1/98	Applicant Identifier N/A
		3. DATE RECEIVED BY STATE N/A	State Application Identifier N/A
		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier
<b>5. APPLICANT INFORMATION</b>			
Legal Name: The Regents of the Univ. of Calif.		Organizational Unit: College of ENGR: CEE	
Address (give city, county, state, and zip code): Office of the Vice Chancellor for Research 410 Mrak Hall, University of California One Shields Avenue, Davis, CA 95616		Name and telephone number of person to be contacted on matters involving this application (give area code): Sandra Dowdy, Contract & Grant Analyst (530) 752-2075	
6. EMPLOYER IDENTIFICATION NUMBER (EIN): 9 4 - 6 0 3 6 4 9 4		7. TYPE OF APPLICANT: (enter appropriate letter in box) <input checked="" type="checkbox"/> I A. State B. County C. Municipal D. Township E. Interstate F. Intermunicipal G. Special District H. Independent School Dist. I. State Controlled Institution of Higher Learning J. Private University K. Indian Tribe L. Individual M. Profit Organization N. Other (Specify):	
8. TYPE OF APPLICATION: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision If Revision, enter appropriate letter(s) in box(es) <input type="checkbox"/> <input type="checkbox"/> A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify):		9. NAME OF FEDERAL AGENCY: U.S. Bureau of Reclamation (CALFED Bay-Delta Program)	
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: TITLE N/A		11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Fish Passage Improvements in Clear Creek: Effects of Removal of McCormick Dam on Sediment Transport	
12. AREAS AFFECTED BY PROJECT (Cities, Counties, States, etc.): United States			
13. PROPOSED PROJECT		14. CONGRESSIONAL DISTRICTS OF:	
Start Date 12/1/98	Ending Date 11/30/99	a. Applicant III b. Project III	
15. ESTIMATED FUNDING:		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?	
a. Federal	\$ 92,963.00	a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON: DATE	
b. Applicant	\$ 24,295.00	b. NO <input checked="" type="checkbox"/> PROGRAM IS NOT COVERED BY E.O. 12372	
c. State	\$ .00	<input type="checkbox"/> OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW	
d. Local	\$ .00	17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?	
e. Other	\$ .00	<input type="checkbox"/> Yes If "Yes," attach an explanation <input checked="" type="checkbox"/> No	
f. Program Income	\$ .00		
g. TOTAL	\$ 117,258.00		
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN ONLY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.			
a. Type Name of Authorized Representative		b. Title Sandra M. Dowdy Contracts and Grants Analyst	c. Telephone Number (530) 752-2075
e. Signature of Authorized Representative <i>Sandra M. Dowdy</i>		d. Date Signed JUN 29 1998	

**Figure 2**  
**Standard Form 424A**

**BUDGET INFORMATION - Non-Construction Programs**

OMB Approval No. 0348-0044

<b>SECTION A - BUDGET SUMMARY</b>						
Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. CALFED		\$	\$	\$ 92,963	\$ 23,295	\$ 117,258
2.						
3.						
4.						
5. Totals		\$	\$	\$ 92,963	\$ 23,295	\$ 117,258
<b>SECTION B - BUDGET CATEGORIES</b>						
6. Object Class Categories		GRANT PROGRAM FUNCTION OR ACTIVITY				Total (5)
		(1)	(2)	(3)	(4)	
a. Personnel		51,332				51,332
b. Fringe Benefits		2,475				2,475
c. Travel		1,500				1,500
d. Equipment		2,000				2,000
e. Supplies		1,000				1,000
f. Contractual						
g. Construction						
h. Other		9,600				9,600
i. Total Direct Charges (sum of 6a-6h)		67,907				67,907
j. Indirect Charges		25,056				25,056
k. TOTALS (sum of 6i and 6j)		\$ 92,963	\$	\$	\$	\$ 92,963
7. Program Income		\$	\$	\$	\$	\$

**Figure 2**  
**Standard Form 424A (cont'd.)**

SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8. CALFED Bay-Delta Program	\$ 24,295	\$	\$	\$ 24,295
9.				
10.				
11.				
12. TOTAL (sum of lines 8 - 11)	\$ 24,295	\$	\$	\$ 24,295

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 92,963	\$ 23,241	\$ 23,241	\$ 23,241	\$ 23,240
14. NonFederal	24,295	6,074	6,074	6,074	6,073
15. TOTAL (sum of lines 13 and 14)	\$ 117,258	\$ 29,315	\$ 29,315	\$ 29,315	\$ 29,313

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	\$	\$	\$	\$
17.				
18.				
19.				
20. TOTAL (sum of lines 16-19)	\$	\$	\$	\$

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges: 67,907	22. Indirect Charges: 44.5% of MTDC
23. Remarks:	

Authorized for Local Reproduction

Standard Form 424A (Rev. 4-92) Page 2

1-008554

1-008554

Figure 3  
Standard Form 424B

OMB Approval No. 0348-0040

ASSURANCES — NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET, SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

**NOTE:** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.


As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U. S. C. §4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C F R 900, Subpart F).
6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U. S. C. §1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U. S. C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U. S. C. §6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
- X Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.



Figure 3  
Standard Form 424B (cont'd.)

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §§276c and 18 U.S.C. §§374), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally assisted construction subagreements.
10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. §§ 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).
12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).
14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.
15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.
16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.
17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984 or OMB Circular No. A-133, Audits of Institutions of Higher Learning and other Non-profit Institutions.
18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL  	TITLE  Sandra M. Dowdy Contracts and Grants Analyst
APPLICANT ORGANIZATION  THE REGENTS OF THE UNIVERSITY OF CALIFORNIA	DATE SUBMITTED  JUN 29 1998